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ABSTRACT

This competency-based module uses the Ocean County (New Jersey) Vocational-Technical Schools curriculum-infused model for infusing basic skills instruction into vocational education. The model demonstrates the relationship of vocational skills to communication, mathematics, and science. The document begins with a philosophy statement; preface; a table that explains the number of hours required for academic credit in various programs and the number of those hours that are devoted to basic skills and vocational activities; matrices that show in which courses specific basic skills are taught; a list of objectives; and an explanation of student activities. Most pages in the document are tables that describe the relationship of vocational skills to basic skills within the plumbing and heating program. These pages are organized by instructional unit and the topics within them. For each topic and associated task(s) are listed the theory and basic skills covered. Also listed are the expected student outcomes. The 19 instructional units included are: orientation; materials: steel pipe; fittings: steel pipe; hand tools: threading steel pipe; power tools; hand tools: manual; hand tools: power; measuring; cast iron soil pipe selection (C.I.); no-hub soil pipe selection; copper tubing; plastic pipe and tubing; waste pipe/venting; testing; plumbing fixtures and appliances; waste handling techniques; water distribution; hot water heating systems; and solar. (CML)

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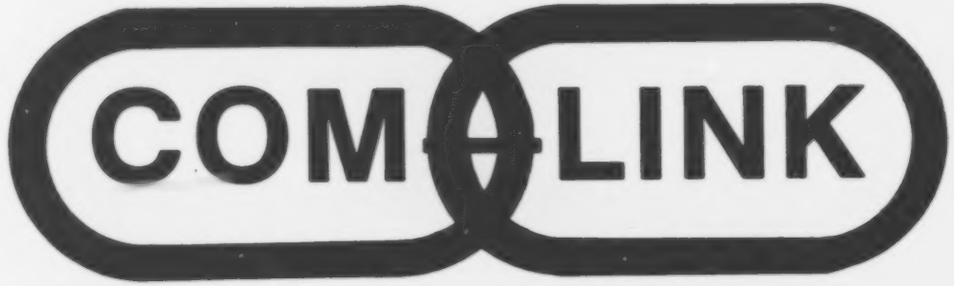
Competency Based Vocational Curricula



With Basic Skills And Academic Linkages

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In Cooperation With The

New Jersey State Department of Education

Division of Vocational Education

And

Ocean County Vocational-Technical School

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Ocean County Vocational-Technical School

Plumbing and Heating

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PHILOSOPHY OF EDUCATION

The Ocean County Vocational-Technical Education Program should consist of those courses, activities and experiences which are designed to prepare students for a successful entrance in a given field of work. The program should be based upon an analysis of the worker needs of the field of work, the opportunities and requirements for entrance, and the particular characteristics and needs of the students.

We believe that:

The school should educate and train the students to live effectively in our ever-changing world.

The school should provide, for each student, intensive training toward general and specific job objectives, and setting standards of performance in keeping with the requirements of that particular field of work.

All students should evidence the interest, aptitude, and ability to profit from the specialized instruction, and this should be a condition of entrance into or continuance in a given field of work.

Equal attention should be given in the school program to develop sound character, good citizenship, ability to think critically, and maintain good mental and physical health.

The school must be constantly striving to fulfill its ultimate purpose; that of serving the students and the community. The school should give careful consideration to the needs, interests, and capacities of the students and the educational and technical background, experience, training, and professional interest of the professional staff as they develop a working philosophy of education.

PREFACE

The curriculum format employed by this project is competency based and utilizes the Ocean County Vocational-Technical Schools' curriculum infused model for the teaching of basic skills as part of vocational education. The design demonstrates the relationship of vocationally related skills to communication, mathematics and science knowledge. Proficiences with regard to student outcomes cannot be achieved without mastery in related academic areas. All student outcome objectives are predicated upon entry level skills which reflect the dictates of the job marketplace and industry. In addition, basic skills matrices developed by the district are included. The totality of this package is designed to facilitate the vocational teaching process and to enchance the learning experiences of our students.

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
AIR CONDITIONING, REFRIGERATION AND HEATING	900	140	120	120	520
AUTO BODY REPAIR	900	130	120	125	525
AUTOMOTIVE MECHANICS	900	150	120	120	510
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	900	216	126	125	433
BEAUTY CULTURE I AND II	1000	240	120	130	515
BUILDING TRADES	900	135	120	130	515
BUSINESS RELATIONS - MEDIA/MODELING	450	200	60	40	150
CHILD CARE AIDE	900	240	120	122	418
COMMERCIAL ART AND PRINTING	900	120	215	75	580
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	900	130	125	130	515

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120 hours per year needed for 5 credits
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COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
COMMERCIAL PHOTOGRAPHY & TELEVISION PRODUCTION	900	150	125	80	545
CUSTOM CABINETMAKING	900	130	120	60	590
DENTAL ASSISTING	450	168	65	77	140
DESIGN DRAFTING	900	135	150	165	450
ELECTRICAL TRADES	900	106	120	124	550
FASHION MERCHANDISING	450	200	60	40	150
FOOD SERVICES	900	206	132	125	437
INDUSTRIAL AUTOMATION AND ELECTRONICS	900	129	140	132	499
INTERIOR DESIGN	900	210	130	120	440
LANDSCAPING AND GREENHOUSE TECHNOLOGY	900	125	125	175	475

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
MARINE ENGINE AND BOAT SERVICES	900	164	120	125	491
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	450	173	60	77	140
MEDICAL SKILLS AND RELATED HEALTH CAREERS	450	135	65	125	125
MEDICAL SKILLS (ADVANCED)	450	125	60	125	140
PLUMBING AND HEATING	900	140	120	120	520
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	900	125	130	60	585
T.V. AND COMPUTER REPAIR	900	125	150	175	450
WELDING	900	135	120	100	545

COMMUNICATION SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School.
The asterisk indicates that the topic is studied in that curriculum.

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact/Opinion Distinction	Signal Words	Parts of Textbook/Manual	Following Directions	Outlining and Note Taking	Interpretation of Maps, Graphs and Charts	Interpretation of Diagrams	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communications	Study Skills	Resume Writing	Job Application Skills
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
AUTOMOTIVE MECHANICS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
CHILD CARE AIDE	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CUSTOM CABINETMAKING	*	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*

COMMUNICATION SKILLS - CONTINUED

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact/Opinion Distinction	Signal Words	Parts of Text-book/Manual	Following Directions	Outlining and Note Taking	Interpretation of Maps, Graphs and Charts	Interpretation of Diagrams	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communications	Study Skills	Resume Writing	Job Application Skills
DESIGN DRAFTING	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
FASHION MERCHANDISING	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
FOOD SERVICES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*		*	*			*	*	*	*	*	*	*	*	*	*	*	*
INTERIOR DESIGN	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WELDING	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

MATHEMATICS SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. The asterisk indicates that the topic is studied in that curriculum.

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigonometric Functions	Graphs
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*	*	*	*	*	*	*	*	*		*
AUTOMOTIVE MECHANICS	*	*	*	*	*	*	*	*	*			*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*		*	*		*			*			*
CHILD CARE AIDE	*	*	*	*	*	*		*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*		*	*	*		*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*	*	*	*	*	*
CUSTOM CABINETMAKING	*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*		*	*			*

MATHEMATICS SKILLS - CONTINUED

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigonometric Functions	Graphs
DESIGN DRAFTING	*	*	*	*	*	*		*	*	*	*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*	*	*
FASHION MERCHANDISING	*	*	*	*	*	*		*	*	*		*
FOOD SERVICES	*	*	*	*	*	*		*	*	*		*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*	*	*	*		*	*	*	*	*
INTERIOR DESIGN	*	*	*	*	*	*		*	*	*		*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*		*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*	*	*	*		*			*	*
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	*	*	*	*	*	*	*	*	*	*		*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*		*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*		*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*			*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*		*	*	*
WELDING	*	*	*	*	*	*		*	*	*	*	*

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SCIENCE SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits in your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
COURSE	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
AIR CONDITIONING, REFRIGERATION AND HEATING							*	*	*	*	*	*		*	*	*				*	*	
AUTO BODY REPAIR								*	*	*	*	*	*	*	*					*		*
AUTOMOTIVE MECHANICS								*		*	*	*	*	*	*	*				*		
AUTOMOTIVE DIESEL AND ENGINE REBUILDING								*		*	*	*		*	*	*	*			*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*				*	*	*	*		*	*					*	
BUILDING TRADES							*	*	*	*	*	*	*		*	*		*		*		
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	N	*O	*T	*A	V	*A	I	L	A	B	L	E										
CHILD CARE AIDE	*	*	*	*	*	*			*		*	*		*	*			*	*		*	*
COMMERCIAL ART AND PRINTING CAREERS	N	O	T	A	V	A	I	*L	A	*B	*L	*E	*		*	*						*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*		*		*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	N	O	T	A	V	*A	I	*L	A	*B	*L	*E	*		*	*						*
CUSTOM CABINETMAKING	*N	O	T	A	V	A	I	*L	A	*B	*L	*E			*			*				
DENTAL ASSISTING	*	*	*	*	*	*				*	*	*	*								*	*

SCIENCE SKILLS - CONTINUED

COURSE	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
DESIGN DRAFTING							*	*	*	*		*	*		*	*	*			*		*
ELECTRICAL TRADES							*	*	*	*	*		*	*	*	*	*		*			
FASHION MERCHANDISING	*	*	*	*		*		*		*	*	*	*								*	
FOOD SERVICES					*	*		*	*		*	*	*		*				*		*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS								*		*			*	*	*	*	*			*		
INTERIOR DESIGN		*	*			*	*	*	*	*	*	*	*		*	*						
LANDSCAPING AND GREENHOUSE TECHNOLOGY							*	*	*		*	*	*		*	*		*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE								*	*	*	*	*	*	*	*	*		*		*		
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	N	* O	* T	* A	* V	* A	I	L	A	B	* L	E										*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*		*		*	*					*			*		*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*		*		*	*					*			*		*	*
PLUMBING AND HEATING					*		*	*	*	*	*	*			*	*		*		*		*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	N	O	T	A	V	A	I	* L	A	* B	* L	* E	*	*	*	*				*		*
T.V. AND COMPUTER REPAIR										*	*	*	*	*	*	*				*		
WELDING								*		*	*	*	*	*	*	*				*		

COURSE OBJECTIVES

1. To prepare students with entry level skills, abilities and knowledge for employment in plumbing and heating.

2. To present 900 hours of instruction and practice in plumbing and heating in accordance with the course curriculum and skill profile outline.

3. To provide a detailed summary evaluation of the proficiency achieved by each student representing the most important content areas presented in the plumbing and heating skill profile.

4. To help each student develop positive attitudes and ideals related to their occupation in plumbing and heating and understand their own capabilities and potential.

5. To instill in each student the need to plan for their professional growth through continuous learning in their chosen occupation.

STUDENT ACTIVITIES

All students enrolled in the Ocean County Vocational-Technical School are encouraged to join Vocational Industrial Clubs of America (VICA). Student activities are infused into each program. Each building has a student government and a student activities program separate from VICA. Additionally, students from each center and every class are encouraged to participate in the VICA Leadership and Job Demonstration Contests which begin in the centers and radiate throughout the district as Ocean County Vocational-Technical School inter school winners are chosen.

Student activities emphasize the basic precepts of VICA, as well as the basic tenets of democracy. Within the context, each of our programs teaches the dignity of work, high standards in trade ethics and safety, and a belief in the free enterprise economic system.

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UNIT: ORIENTATION TO PLUMBING AND HEATING

TOPIC: POLICIES AND RULES OF SAFETY

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify and discuss school policies	A. Instructional units	A. Oral communication	A. Definitions	A. Flammable, toxic and volatile chemicals	A. The student will be able to delineate the units of instruction
II. Identify responsibility to protect the environment	B. Grading system	B. Writing skills	B. Symbols	B. Toxic fumes resulting from a fire	B. The student will be able to describe the grading system
III. Identify responsibility to protect the health of the general public	C. Student personnel system	C. Reading skills		C. Pollution 1. Air 2. Water	C. The student will be able to demonstrate a safe and orderly exit
IV. Identify responsibility to work safely	D. Fire drill procedure	D. Vocabulary		D. Diseases	D. The student will be able to interpret the student handbook
V. Identify entry level skills in the plumbing trade	E. Student handbook	E. Following directions		E. Waste Disposal	E. The student will be able to describe the role of a plumber and heating mechanic
	F. Job description	F. Safety in relation to other workers			F. The student will be able to delineate the General Safety Regulations
	G. General safety regulations	G. Test taking skills			G. The student will be able to describe the C.I.E. program
	H. Student attendance contract	H. Study skills			H. The student will be able to define VICA and explain its function
	I. Cooperative Industrial Education (C.I.E.) program				I. The student will be able to prepare a resume
	J. Vocational Industrial Clubs of America (VICA)				J. The student will be able to complete a job application
	K. Resume and job applications				K. The student will be able to explain his/her responsibility to protect the public health and environment
	L. Responsibility to protect the environment				L. The student will be able to identify entry level skills in the plumbing trade
	M. Responsibility to protect the public health				M. The student will be able to complete the orientation quiz with 70% accuracy

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify the types of steel pipe A. Black B. Galvanized II. Identify and select proper steel pipe sizes III. Identify the difference between outside and inside diameters	A. Uses of steel pipe 1. Black 2. Galvanized B. Proper use of inside diameter (I.D.) steel pipe	A. Vocabulary B. Following directions C. Oral communication D. Leadership skills E. Note taking F. Test taking skills G. Selection skills H. Reading skills J. Blueprint reading I. Schematic drawing K. Study skills	A. Addition B. Subtraction C. Ruler skills (measuring) D. Common fractions E. Whole numbers F. Convert fractions to whole numbers G. Measure inside diameters H. Measure outside diameters I. Symbols J. Abbreviations K. Mensuration L. Outside diameters M. Inside diameters N. Estimating	A. Material composition B. Manufactured pipe 1. Seamless 2. Lap welded 3. Butt welded C. Gauge standards D. Bursting pressure E. Steam F. Expansion and contraction G. Mass and weight H. Hydraulics I. Flow rates	A. The student will be able to select proper steel pipe B. The student will be able to identify size (I.D.) C. The student will be able to assemble student project on steel pipe D. The student will be able to pass a student project test E. The student will be able to pass a written test with 70% accuracy

UNIT: FITTINGS - STEEL PIPE

TOPIC: CAST AND MALABLE FITTINGS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Select proper fittings A. Black B. Galvanized II. Select cast or malable fittings A. Cast B. Black malable C. Galvanized malable D. Galvanized drainage	A. Uses of steel pipe 1. Black 2. Galvanized B. Uses of cast fittings 1. Steam 2. Hot water 3. Galvanized drainage C. Uses of galvanized malable fittings D. Uses of black malable fittings	A. Oral communication B. Vocabulary C. Following directions D. Leadership skills E. Note taking F. Reading skills G. Selection skills H. Test taking skills I. Blueprint reading J. Schematic drawing K. Study skills	A. Measuring skills B. Selection of proper sized (I.D.) fittings C. Symbols D. Abbreviations E. Mensuration F. Estimating	A. Material composition B. Manufacture of fittings C. Dissimilar metals - electrolysis D. Gauge standards E. Mass and weight F. Pressure G. Steam H. Expansion and contraction I. Hydraulics J. Flow rates	A. The student will be able to describe the uses of cast fittings B. The student will be able to assemble cast fittings into a steel pipe project C. The student will be able to assemble black or galvanized malable fittings into a steel pipe project D. The student will be able to test his/her project with air E. The student will be able to assemble the pipe project safely F. The student will be able to pass a pipe test with 70% accuracy

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Select hand tools affiliated with steel pipe A. Selection B. Proper use C. Tool care D. Tool repair	Cutting, reaming and threading 1. Pipe vises' a. yoke b. chain 2. OO-R ratchet threader (⅛" to 1" steel pipe) 3. Pipe reamer 4. Oiler 5. 65-R ratchet threader (1" to 2" ID steel pipe) 6. Pipe wrenches	A. Vocabulary B. Following directions C. Oral communication D. Leadership skills E. Note taking F. Reading skills G. Test taking skills H. Selection skills I. Blueprint reading J. Schematic drawing K. Study skills	A. Measuring (ruler) B. Addition (whole numbers) C. Subtraction (whole numbers) D. Addition of common fractions E. Subtraction of common fractions F. Converting fractions to whole numbers and fractions G. Abbreviations H. Blueprint reading I. Estimating	A. Measurements B. Water C. Heating D. Heat and work E. Energy F. Power G. Pressure H. Mechanical powers I. Leverage J. Expansion and contraction	A. The student will be able to cut-ream-thread steel pipe up to 2" I.D. B. The student will be able to select proper pipe for C-R-T project C. The student will be able to select the proper equipment to C-R-T D. The student will be able to use all tools and equipment safely E. The student will be able to repair C-R-T equipment F. The student will be able to clean and take care of all equipment and tools G. The student will pass a visual and written test with 70% accuracy

UNIT: POWER TOOLS - THREADING STEEL PIPE

TOPIC: CUTTING · REAMING· THREADING (C·R·T)

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Use power tools safely A. Selection B. Use properly C. Tool care D. Tool repair	A. Rigid power pipe vise B. 504 quick opening die set C. OO-R ratchet threader D. Oiler E. Pipe reamer F. 8" abrasive cut-off machine G. Rigid 124 electric cleaning machine H. 535 rigid power vise	A. Vocabulary B. Following directions C. Oral communication D. Leadership skills E. Note taking F. Reading skills G. Test taking skills H. Selection skills I. Blueprint reading J. Schematic drawings K. Study skills	A. Measuring with a ruler B. Addition of whole numbers C. Subtraction of whole numbers D. Addition of common fractions E. Subtraction of common fractions F. Converting fractions to whole numbers and fractions G. Abbreviations H. Blueprint reading I. Estimating skills	A. Measurements B. Water C. Heat D. Work and heat E. Energy F. Power G. Pressure H. Electricity I. Mechanical powers J. Leverage K. Expansion and contraction	A. The student will be able to C·R·T steel pipe up to 2" I.D. B. The student will be able to select the proper pipe for C·R·T project C. The student will be able to select the power tools necessary to C·R·T steel pipe D. The student will be able to use all power equipment safely E. The student will be able to clean and take care of equipment and tools F. The student will pass a visual and written test with 70% accuracy

UNIT: HAND TOOLS - MANUAL

TOPIC: SELECTION AND PROPER USE

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Hand tools A. Plumb bob B. Chalk line C. Level D. Ruler E. Tape F. Pliers G. Bench vise H. Saws 1. wood 2. plastic 3. sheet rock I. Chisels 1. steel 2. wood J. Bits 1. steel 2. wood K. Hammers L. Mauls M. Screwdrivers 1. regular 2. phillips N. Bending tools O. Files P. Hand drills Q. Hand sewer snakes R. Wrenches 1. open end 2. box 3. adjustable 4. socket S. Shovels T. Picks	Safe use of hand tools 1. Cleaning 2. Repairing 3. Selection	A. Vocabulary B. Following directions C. Oral communication D. Leadership skills E. Note taking F. Reading skills G. Test taking skills H. Selection skills I. Study skills	A. Measuring B. Addition (whole numbers) C. Subtraction (whole numbers) D. Subtraction of fractions E. Addition of fractions F. Converting fractions to whole numbers and mixed numbers G. Abbreviations H. Blueprint reading I. Estimating	A. Measurement B. Water C. Heat D. Energy E. Power F. Pressure G. Levers H. Wheels I. Axels J. Pulleys K. Screws L. Wedges M. Expansion and contraction N. Hydraulics	A. The student will be able to select the proper hand tool B. The student will be able to use the hand tool safely C. The student will be able to repair hand tools D. The student will be able to pass a visual and written test with 70% accuracy

UNIT: HAND TOOLS - POWER

TOPIC: SELECTION AND PROPER USE

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify and use safely the following power tools A. 8" abrasive cutoff machine B. Pistol drill C. Right angle drill D. Power hacksaw E. Electric sewer snake F. Electric jack hammer G. Grinder H. Circular saw	A. Selection of power hand tools B. Cleaning of power hand tools C. Repairing of power hand tools D. Safe use of power hand tools	A. Vocabulary B. Following directions C. Oral communication D. Leadership skills E. Note taking F. Reading skills G. Test taking skills H. Selection skills I. Study skills	A. Measuring B. Selecting sizes C. Abbreviations D. Symbols E. Definitions F. Notation G. Estimating H. Mensuration	A. Measurement B. Electrical energy C. Power D. Pressure E. Leverage F. Heat G. Hydraulics H. Energy I. Mechanical powers J. Lever K. Expansion and contraction	A. The student will be able to select the proper electric hand tool B. The student will be able to use power tools safely C. The student will be able to repair electrical power tools D. The student will be able to pass a visual and written test with 70% accuracy

UNIT: MEASURING

TOPIC: SELECTION AND USE OF MEASURING EQUIPMENT

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Six foot ruler (6' extension) II. Tape rulers A. 12' tapes B. 25' tapes C. 50' tapes D. 100' tapes III. Conversion of measurements A. 1/8" equals 10' B. 1/16" equals 10' C. 1/4" equals 10' IV. Blueprint conversions A. Inches B. Feet V. Measure distances or runs of piping systems	A. Uses of a 12" ruler B. Uses of 6' folding ruler C. Uses of tape measures 1. 12' 2. 25' 3. 50' 4. 100' D. Conversion of fractions to to feet E. Blueprint conversions F. Measure long runs of piping	A. Vocabulary B. Following directions C. Oral communication D. Leadership skills E. Note taking F. Reading skills G. Test taking skills	A. Measuring B. Addition of whole numbers C. Subtraction of whole numbers D. Addition of common fractions E. Subtraction of common fractions F. Converting fractions to whole numbers G. Conversion of measurements to inches H. Conversion of measurements to feet I. Symbols J. Abbreviations K. Mensuration L. Estimating	A. Measurement B. Reading a micrometer C. Gauge standards D. Pressure E. Pressure scales F. Gravity	A. The student will demonstrate the use of measuring equipment 1. 6' ruler 2. various tape lengths B. The student will be able to add and subtact whole numbers C. The student will be able to change whole numbers to fractions D. The student will be able to change fractions to whole numbers or mixed numbers E. The student will be able to convert measurements to feet and/or inches F. The student will pass a measurement test with 70% accuracy

UNIT: CAST IRON SOIL PIPE SELECTION (C.I.)

TOPIC: USES, SELECTION AND JOINING OF CAST IRON SOIL PIPE AND FITTINGS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify and select various cast iron soil pipe A. Extra heavy B. Medium II. Identify and select various cast iron soil pipe fittings A. Extra heavy B. Medium III. Select proper cast iron assembly tools A. Caulking irons B. Lead ladle C. Propane furnace equipment D. Ball pien hammers E. Rope runners F. Trimming irons G. Gasket assembly tool H. Chain cutter IV. Select neoprene gaskets A. Extra heavy B. Medium V. Select lubricant VI. Select proper size assembly tool VII. Use safe installation methods for A. Lead and oakum joints B. Neoprene gaskets	A. Uses of various types of cast iron soil pipe B. Uses of various types of cast iron soil pipe fittings C. Various methods of joining cast iron soil pipe and fittings D. Testing cast iron soil pipe and fittings E. Safe use of tools and equipment used to join cast iron soil pipe F. Selection and use of neoprene gaskets	A. Oral communication B. Writing skills C. Reading skills D. Vocabulary E. Following directions F. Note taking G. Test taking skills H. Leadership skills I. Blueprint reading J. Schematic drawings	A. Measuring B. Accuracy in cutting cast iron soil pipe C. Selection of cast iron soil pipe D. Selection of cast iron soil pipe fittings E. Symbols F. Abbreviations G. Blueprint reading	A. Material composition B. Joining techniques C. Melting point of lead D. Gases used in melting lead E. Measurements F. Mass and weight G. Water H. Pressure I. Expansion and contraction J. Water flow	A. The student will be able to select the proper cast iron soil pipe B. The student will be able to select the proper cast iron soil pipe fitting C. The student will be able to assemble cast iron soil pipe and fittings D. The student will be able to assemble cast iron soil pipe and fittings safely E. The student will be able to test the cast iron soil project safely F. The student will be able to pass a written test on cast iron soil pipe with 70% accuracy G. The student will demonstrate how to safely use all tools and equipment in assembling cast iron soil pipe

UNIT: NO-HUB SOIL PIPE SELECTION

TOPIC: USES OF NO-HUB SOIL PIPE AND FITTINGS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify and select no-hub soil pipe II. Identify and select no-hub soil pipe fittings III. Identify and select proper assembly tools A. Torque wrench B. Chain cutter C. File	A. Uses of no-hub soil pipe and fittings B. Method of joining no-hub soil pipe and fittings C. Methods of testing no-hub fitting and piping D. Safe use of tools and equipment used in installing no-hub piping systems	A. Oral communications B. Writing skills C. Reading skills D. Vocabulary E. Following directions F. Note taking G. Test taking skills H. Leadership skills I. Blueprint reading J. Schematic drawings	A. Measuring B. Accuracy in cutting no-hub soil pipe C. Selecting proper sized no-hub soil pipe D. Symbols E. Abbreviations F. Blueprint reading G. Mensuration	A. Material composition of no-hub pipe and fittings B. Measurements C. Mass and weight D. Density E. Water F. Pressure G. Expansion and contraction H. Water flow	A. The student will be able to select the proper no-hub pipe size and fittings B. The student will be able to cut and assemble no-hub soil pipe C. The student will be able to test a no-hub cast iron soil project D. The student will be able to pass a written test on no-hub pipe with 70% accuracy E. The student will be able to use safely all tools and equipment in working with cast iron soil pipe

UNIT: COPPER TUBING

TOPIC: SELECT AND INSTALL TUBING AND FITTINGS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Select tubing A. DWV B. M C. L D. K II. Select fittings A. DWV (drainage) B. Pressure C. Flare D. Compression III. Install copper tubing A. Soldering B. Brazing C. Flaring D. Compression IV. Assemble copper tubing and fittings V. Select proper tools for assembling copper tubing A. Tubing cutter B. Sanding cloth C. Flux D. Solder E. Prestolite tank F. Striker G. Proper soldering tip H. Flaring tool I. Flaring block J. Wrenches for compression joints	A. Use of various types of copper tubing B. Joining together of copper tubing 1. Cleaning 2. Soldering 3. Flaring 4. Compression 5. Brazing C. Color codes of copper tubing D. Selection of copper tube 1. Hard draw 2. Soft (coils) E. Test piping systems 1. Air 2. Water	A. Oral communication B. Writing skills C. Reading skills D. Vocabulary E. Following directions F. Note taking G. Test taking skills H. Blueprint reading I. Schematic drawings	A. Measuring B. Accuracy in cutting tubing C. Selection of proper sized tubing D. Selection of proper sized fittings E. Symbols F. Abbreviations G. Measuration H. Blueprint reading	A. Material composition B. Melting points of solder 1. Fahrenheit 2. Centigrade C. Compositions of solder D. Brazing materials E. Gas mixtures 1. Acetylene 2. Oxygen 3. Air F. Measurements G. Gauge standards H. Mass and weight I. Water J. Heat K. Energy L. Pressure M. Pressure scales N. Thermometers O. Expansion and contraction P. Hydraulics Q. Flow of water	A. The student will be able to select copper tubing and fittings to be used B. The student will be able to join copper tubing using 1. Solder techniques 2. Brazing techniques 3. Flare techniques 4. Compression techniques C. The student will be able to select copper tubing for piping system D. The student will be able to test copper project E. The student will be able to pass a written test with 70% accuracy

UNIT: PLASTIC PIPE AND TUBING

TOPIC: ABS - PVC - CPVC - P.E. (PIPE-TUBING-FITTINGS)

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify and and select proper plastic pipe A. ABC B. PVC C. CPVC D. P.E.	A. Uses of various types of plastic pipe	A. Oral communication	A. Measuring	A. Material composition	A. The student will be able to select the proper plastic pipe or tubing
II. Select proper plastic fittings A. ABC B. PVC C. CPVC D. P.E.	B. Uses of various sizes of plastic pipe	B. Writing skills	B. Accuracy in cutting plastic pipe and tubing	B. Cleaning solvent composition	B. The student will be able to select the proper plastic solvent
III. Select proper plastic cleaner	C. Joining together of plastic pipe and tubing	C. Functional reading skills	C. Selection of proper sized pipe and tubing	C. Solvent cement composition	C. The student will be able to clean plastic pipe, tubing and fittings
IV. Select proper plastic solvents A. ABC B. PVC C. CPVC	D. Testing of plastic pipes and fittings	D. Vocabulary	D. Selection of proper sized fittings	D. Measurement	D. The student will be able to select the proper plastic fittings
V. Assemble plastic pipe and fittings	E. Safe handling of plastic solvents and cleaners	E. Following directions	E. Symbols	E. Mass and weight	E. The student will be able to assemble plastic piping and fittings
VI. Test plastic pipe project safely	F. Safe use of tools and equipment used in working with plastics	F. Note taking skills	F. Abbreviations	F. Water	F. The student will be able to assemble a plastic project safely
VII. Assemble plastic pipe with proper equipment A. Tubing cutter B. Saw C. File D. Reamer		G. Test taking skills	G. Mensuration	G. Heat	G. The student will be able to test safely a plastic project
VIII. Use tools and equipment safely		H. Blueprint reading	H. Blueprint reading	H. Pressure	H. The student will be able to pass a written test on plastic with 70% accuracy
		I. Schematic drawings	I. Estimating	I. Expansion and contraction	
				J. Hydraulics	
				K. Flow rate	
				L. Chemicals (plastic)	
				M. Waste disposal	
				N. Botany	

UNIT: WASTE PIPE/VENTING

TOPIC: DESIGN AND INSTALLATION

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify waste pipe sizes for fixtures A. Toilet B. Basin C. Bathtub D. Shower E. Kitchen sink F. Vanity G. Laundry tub	A. Waste handling	A. Vocabulary	A. Measuring (ruler)	A. Measurements	A. The student will be able to identify the proper waste pipe/vent pipe sizes for a fixture or appliance
II. Identify waste pipe size for appliance A. Hot water heater B. Washing machine C. Dishwasher D. Garbage disposal	B. Waste lines	B. Following directions	B. Symbols	B. Water	B. The student will be able to select proper waste and vent pipe material
III. Identify vent pipe sizes for fixtures and appliances	C. Vent lines	C. Oral communication	C. Abbreviations	C. Pressure	C. The student will be able to make a material list
IV. Estimate cost of waste pipe/vent pipes	D. Fixture selection	D. Leadership skills	D. Definitions	D. Expansion and contractions	D. The student will be able to select and use proper material and equipment
V. Select proper material for installation of waste and vent pipes	E. Blueprint reading	E. Note taking skills	E. Mensuration	E. Gravity	E. The student will be able to identify and pass a verbal and written test with 70% accuracy
VI. Install soil waste pipe with proper equipment	F. Fixture installation	F. Functional reading skills	F. Addition (whole numbers)	F. Lift	
VII. Install vent pipes using proper equipment	G. Water lines	G. Test taking skills	G. Subtraction (whole numbers)	G. Hydraulics	
VIII. Install waste and vent pipes using safe and proper installation methods	H. State plumbing codes	H. Selection skills	H. Ratio and proportion	H. Diseases	
	I. Estimating materials	I. Blueprint reading	I. Percentages	I. Waste disposal	
		J. Schematic drawing	J. Estimating	J. Botany	

UNIT: TESTING

TOPIC: TEST PIPE SYSTEMS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Test cast iron soil pipe A. Air B. Water C. Smoke	A. Testing procedures for cast iron soil pipe	A. Vocabulary	A. Measuring	A. Measurements	A. The student will be able to identify and test a waste and vent pipe system
II. Test copper tubing A. Distribution lines hot and cold 1. Air 2. Water B. Water service	B. Testing copper water lines	B. Following directions	B. Symbols	B. Water	B. The student will be able to test a copper distribution system
III. Test copper drainage systems A. Air B. Water C. Smoke	C. Test copper drainage system	C. Oral communication	C. Abbreviations	C. Pressures	C. The student will be able to test water mains
IV. Test plastic drainage lines - ABS and PVC A. Air B. Water C. Smoke	D. Test plastic drainage systems 1. PVC 2. ABS	D. Leadership skills	D. Definitions	D. Expansion and contraction	D. The student will be able to test fixtures
V. Test plastic water main - P.E. tubing A. Air B. Water	E. Test P.E. plastic water supply tubing	E. Note taking skills	E. Mensuration	E. Gravity	E. The student will be able to test appliances
VI. Test CPVC water lines A. Air B. Water	F. Testing CPVC plastic tubing systems	F. Functional reading skills	F. Addition (whole numbers)	F. Lift	F. The student will be able to pass a verbal and written test with 70% accuracy
VII. Test fixtures - water	G. Testing fixtures	G. Test taking skills	G. Subtraction	G. Gauge standards	
VIII. Test appliances - water	H. Testing appliances	H. Selection skills	H. Percentages	H. Pressure scales	
		I. Blueprint reading		I. Thermometers	
		J. Schematic drawing		J. Mechanical powers	
				K. Hydraulics	
				L. Elementary pumps	
				M. Electricity	
				N. Waste disposal	
				O. Diseases	

UNIT: PLUMBING FIXTURES AND APPLIANCES

TOPIC: FIXTURE AND APPLIANCE SELECTION

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify plumbing fixtures A. Selection B. Measurements C. Trap sizes D. Water connections II. Identify appliances A. Selection B. Measurements C. Trap size D. Water connections III. Estimate quantities and prices IV. Tools needed for fixtures and appliances V. Safe installation practices VI. Layout and design of waste/vent system VII. Testing fixtures and appliances VIII. Identify and select water pumps A. Sump B. Submersible VIIII. Design installation A. Sump pump B. Submersible pump X. Repair fixtures and appliances	A. Identify and select fixtures B. Identify and select appliances C. Identify waste pipe sizes D. Identify vent pipe sizes E. Identify trap sizes F. Identify water connections G. Identify testing procedures of fixtures and appliances H. Repair fixtures and appliances	A. Vocabulary B. Following directions C. Oral communication D. Leadership skills E. Note taking skills F. Functional reading skills G. Test taking skills H. Selection skills I. Blueprint reading J. Schematic drawing	A. Measuring B. Symbols C. Abbreviations D. Definitions E. Mensuration F. Addition of whole numbers G. Subtraction of whole numbers H. Percentages I. Notation and numeration J. Estimating	A. Measurement B. Water C. Heat D. Pressure E. Thermostat F. Steam G. Mechanical powers H. Leverage I. Expansion and contraction J. Melting point K. Gravity L. Hydraulics M. Flow of water in pipes N. Elementary pumps O. Electricity P. Waste handling Q. Chemical compositions R. Diseases	A. The student will be able to identify and select fixtures and appliances B. The student will be able to design a waste and vent pipe system to accomodate fixtures and appliances C. The student will be able to identify proper trap sizes for fixtures and appliances D. The student will be able to identify and design hot and cold water lines to a fixture or appliance E. The student will be able to estimate costs of fixtures and appliances F. The student will be able to test the fixtures and appliances G. The student will be able to identify and select a pump for installation H. The student will be able to fix/repair a fixture, appliance or pump I. The student will be able to visually identify fixtures, appliances and pumps J. The student will be able to pass a written test with 70% accuracy

UNIT: WASTE HANDLING TECHNIQUES

TOPIC: WASTE

Task

I. Identify waste handling techniques
   - A. Sewer plant
   - B. Septic tank with leeching tank
   - C. Septic tank with leeching fields
   - D. Cesspools
   - E. Sanitary sewers

II. Identify disposal methods of waste water and waste products
   - A. Interceptors
   - B. Grease traps

III. Health problems associated with sewerage
   - A. Typhoid
   - B. Diarrhea
   - C. AIDS

IV. Identify lift station techniques

V. Identify gases affiliated with sewerage - methane

VI. Identify uses of waste products - fertilizer

VII. Identify bacteria associated with sewerage
   - A. Annaerobic
   - B. Aerobic

Theory

- A. Techniques of handling waste water
- B. Reasons for disposing of waste products
- C. Identify reasons and methods of handling special waste products
- D. Health problems affiliated with sewerage
- E. Gravity flow and lift stations
- F. Gases and bacteria affiliated with sewerage

Communication Skills

- A. Oral communication
- B. Vocabulary
- C. Note taking skills
- D. Functional reading skills
- E. Selection skills
- F. Test taking skills
- G. Blueprint reading
- H. Schematic drawing interpretation

Mathematics Skills

- A. Symbols
- B. Abbreviations
- C. Definitions
- D. Notations
- E. Ratio and proportions
- F. Mensuration

Science Knowledge

- A. Waste material composition
- B. Mass and weight
- C. Decomposition of waste products
- D. Diseases
- E. Sanitary methods
- F. Pressure
- G. Expansion and contraction
- H. Hydraulics
- I. Flow rates
- J. Gauge reading
- K. Temperatures
   - A. Fahrenheit
   - B. Celsius
- L. Pumps
- M. Lift
- N. Measurements
- O. Gauge standards
- P. Mass and density
- Q. Gravity
- R. Water
- S. Heat
- T. Energy
- U. Power
- V. Electricity
- W. Thermometers
- X. Steam
- Y. Flow of water (rates)

Student Outcome

- A. The student will be able to describe how to handle waste
- B. The student will be able to describe the reasons for handling sewerage safely
- C. The student will be able to identify health problems affiliated with sewerage
- D. The student will be able to identify methods of moving sewerage from one place to another
- E. The student will be able to identify uses of treated sewerage
- F. The student will be able to pass a test with 70% accuracy

UNIT: WATER DISTRIBUTION

TOPIC: POTABLE WATER

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify methods of obtaining potable water A. Wells B. Lakes C. Streams D. Public water companies E. Private water companies II. Identify types of wells A. Deep B. Shallow C. Artisan III. Identify types of pumps used to obtain potable water IV. Methods of bringing potable water to a building V. Methods of running hot and cold water distribution lines VI. Selection of materials for potable water VII. Select tools and equipment for locating and running potable water to a building	A. Sources of potable water B. Types of wells C. Types of pumps D. Methods of bringing potable water to a building	A. Oral communication B. Vocabulary C. Note taking skills D. Functional reading skills E. Selection skills F. Test taking skills G. Schematic drawings	A. Measurements B. Abbreviations C. Blueprint reading D. Schematic reading E. Symbols F. Definitions G. Notation H. Ratio and proportion I. Estimating	A. Water B. Energy C. Power D. Electricity E. Pressure F. Measurements G. Gauges H. Density and weight I. Lift J. Thermometers K. Steam L. Mechanical power M. The wheel N. The pulley O. Expansion and contraction P. Temperatures 1. Fahrenheit 2. Celsius Q. Gravity R. Hydraulics S. Flow rates T. Elementary pumps U. Motors V. Diseases W. Water disposal	A. The student will be able to identify the methods of obtaining potable water B. The student will be able to identify the various types of wells C. The student will be able to identify the various types of pumps used to obtain potable water D. The student will be able to identify the methods of bringing potable water to a building E. The student will be able to select and install potable water materials F. The student will be able to select and use safely all tools and equipment necessary to install potable water G. The student will be able to pass a verbal and written test with 70% accuracy

UNIT: HOT WATER HEATING SYSTEMS

TOPIC: HOT WATER BASEBOARD RADIATION SYSTEM

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify the types of heating systems A. Steam B. Hot air C. Hot water D. Electric II. Identify the types of heating units A. Furnaces B. Hydronic boiler C. Electric III. Identify the types of fuels to heat buildings A. Natural gas B. Propane C. Oil D. Coal E. Electricity F. Kerosene G. Wood IV. Identify the types of materials used in a hot water baseboard radiation system A. Cast iron B. Copper C. Black pipe D. Aluminum E. Brass V. Identify tools and equipment affiliated with installing a hot water baseboard radiation system A. Wrenches, etc. B. Soldering equipment C. CRT equipment D. Hydronic boiler E. Baseboard radiation	A. Types of heating systems B. Types of heating units C. Types of fuels D. Types of materials E. Tools and equipment F. Installation procedures G. Design H. Troubleshoot and repair I. Safety requirements	A. Oral communication B. Vocabulary C. Following directions D. Leadership skills E. Note taking skills F. Functional reading skills G. Selection skills H. Test taking skills I. Blueprint reading J. Schematic drawing interpretation	A. Measuring skills B. Symbols C. Abbreviations D. Measuration E. Definitions F. Ratio and proportion G. Estimating	A. Measurements B. Gauge standards C. Composition of metals D. Mass and weight E. Density F. Specific gravity G. Water H. Expansion and contraction I. Hydraulics J. Flow rates K. Pumps L. Circulators M. Heat N. Heat and work O. Energy P. Pressure Q. Thermometers R. Barometer S. Pressure scales T. Steam U. Mechanical powers V. The lever W. The wheel X. Melting points Y. Gravity Z. Flow of water in pipes A.A. Electricity B.B. Magnetism, etc.	A. The student will be able to identify the various types of heating systems B. The student will be able to identify various types of heating units C. The student will be able to identify the various types of fuels used D. The student will be able to identify the various types of materials used in a hot water baseboard radiation system E. The student will be able to select the tools and equipment used in installing a hot water baseboard radiation system F. The student will be able to install a hot water baseboard radiation system G. The student will be able to design a hot water baseboard radiation system H. The student will be able to troubleshoot and repair a hot water baseboard radiation system I. The student will be able to use safe installation procedures while installing a hot water baseboard radiation system J. The student will be able to pass a verbal and written test with 70% accuracy

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
VI. Install baseboard radiation system safely					
VII. Design a hot water baseboard radiation system					
VIII. Troubleshoot problems and repair the hot water baseboard radiation systems					

UNIT: SOLAR

TOPIC: SOLAR HEATING/HOT WATER

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Identify a hot water solar system A. Air B. Water II. Select hot water solar equipment A. Solar collectors B. Tubing/piping C. Circulators D. Solar hot water heaters E. Controls III. Design a solar hot water heating system VI. Select proper tools A. Soldering equipment B. Electrical equipment C. Wrenches, etc. V. Troubleshoot and repair a hot water solar collection system VI. Use safe installation techniques VII. Identify and describe an active and passive solar heating system III. Maintain a solar hot water heating system	A. Solar heating techniques B. Solar equipment C. Designing a solar hot water heating system D. Safe use of tools E. Troubleshooting and repair of a solar hot water heating system F. Maintaining a solar hot water heating system	A. Oral communication B. Vocabulary C. Symbols D. Following directions E. Leadership skills F. Note taking skills G. Functional reading skills H. Selection skills I. Test taking skills J. Blueprint reading K. Schematic drawing interpretation	A. Measuring skills B. Symbols C. Abbreviations D. Mensuration E. Definitions F. Ratio and proportion G. Percentages H. Trigonometric functions I. Estimating	A. Measurements B. Gauge standards C. Composition of metals D. Electricity E. Solar theory F. Mass and weight G. Gravity H. Lift I. Water J. Fluids K. Expansion and contraction L. Hydraulics M. Flow rates N. Pumps O. Circulation P. Heat Q. Heat and work R. Energy S. Pressure T. Steam U. Thermometers V. Melting points W. Flow of fluids in pipes X. Density Y. Bursting pressure Z. Magnetism, etc.	A. The student will be able to identify the various types of solar heating systems B. The student will be able to select solar hot water equipment C. The student will be able to design a solar hot water heating system D. The student will be able to select the proper tools to be used in a solar hot water heating system E. The student will be able to troubleshoot and repair a solar hot water heating system F. The student will be able to describe how to maintain a solar hot water heating system G. The student will be able to use safe installation techniques when installing a solar hot water heating system H. The student will be able to pass a verbal and written test with 70% accuracy